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In This Issue

Instruction in the Use of Maps Needs To Be Increased . . . . . *Charles W. Saale*

Mineral Fuel Situation in the United States . . . . . *E. Willard Miller*

The Panama Canal Scheduled for a Major Operation . . . . . *W. O. Blanchard*

Using Still-Pictures in Geography . . . . . *Dorothy O. Vegter*

Why Not a Geographic Exchange Club? . . . . . *John W. Conoyer*

Teak—Tropical Hardwood Extraordinary . . . . . *A. D. Perfetti*

Soil Profile Sections . . . . *Arch C. Gerlach*

Wallace W. Atwood, 1872-1949 . . . . . *Henry J. Warman*

The National Council at Work . *Earl B. Shaw*

Editorial Notes and News . . . . . .

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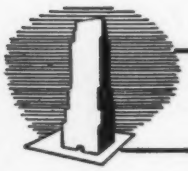

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The JOURNAL *of* GEOGRAPHY

CONTENTS FOR NOVEMBER, 1949

Instruction in the Use of Maps Needs To Be Increased. By Charles W. Saale 309

Dr. Saale is Chairman of the Division of Education and Psychology, Central Washington College of Education at Ellensburg. He is a frequent contributor in the fields of education and psychology. During the war he served as a Commanding Officer in the Navy and has traveled extensively thruout the world.

Mineral Fuel Situation in the United States. By E. Willard Miller 317

Dr. Miller is Professor of Geography and Chief of the Division of Geography at Pennsylvania State College. His special fields of interest are industrial and mineral geography, and he is a frequent contributor to many scientific journals.

The Panama Canal Scheduled for a Major Operation. By W. O. Blanchard 328

Dr. Blanchard is Professor of Geography at the University of Illinois. He has made many contributions to the JOURNAL and other educational magazines.

Using Still-Pictures in Geography. By Dorothy O. Vegter 334

Mrs. Vegter is a teacher of geography in Central Junior High School, Muskegon, Michigan and Chairman of the Geography Committee for that city.

Why Not a Geographic Exchange Club? By John W. Conoyer ... 337

Mr. Conoyer did his graduate work at Washington University and is now Assistant Professor of Geography at Saint Louis University. He is author of a sixth grade text entitled "Geography of Missouri."

Teak—Tropical Hardwood Extraordinary. By A. D. Perfetti 341

Mr. Perfetti is an assistant on the geography staff of the University of Illinois.

Soil Profile Sections. By Arch C. Gerlach 344

Dr. Gerlach is an Associate Professor of Geography at the University of Wisconsin, Vice President of the Wisconsin Council of Geography Teachers and a frequent contributor to educational literature.

Wallace W. Atwood, 1872-1949 350

National Council at Work 351

Editorial Notes and News 352

Contents of the JOURNAL are indexed regularly in the *Educational Index to Periodicals.*
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Annually two prizes, of $25.00 each, are awarded for outstanding articles published in the JOURNAL in the previous five years. The prizes collectively cover most aspects of geography and geographic education. They honor the author and a person who contributed notably to the success of the JOURNAL. The prize awards are named in honor of the following: Richard E. Dodge, Ray H. Whitbeck, George J. Miller, J. Paul Goode, Almon E. Parkins, Ellsworth Huntington, Isaiah Bowman, and Cora P. Sletten.

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VOLUME XLVIII NOVEMBER, 1949 NUMBER 8

INSTRUCTION IN THE USE OF MAPS NEEDS TO BE INCREASED

CHARLES W. SAALE
Central Washington College of Education
Ellensburg

PURPOSE OF MAPS

Maps are abbreviated compilations of knowledge. Things that are nondescript can be illustrated and represented thru the use of maps. For example, it may take a considerable period of time to describe the shape of the Philippine Islands to someone, but with an appropriately constructed map this may be accomplished rather easily. Johnson[1] says that the primary purpose of maps is to enable the user to grasp place relations. Maps are of more value to instruction than the purpose indicated above. The writer agrees this is the use schools generally make of maps. "Maps are representations of the whole or the part of the earth's surface."[2] Maps are a means of putting related things and entities together. It is difficult to understand the modern world without the use of maps. Individual or isolated facts about other countries may mean little unless they can be pictoralized.

Maps can show almost any type of quantitative information. Maps are categorized and classified with respect to the purpose for which they are made, or the data they represent. They are used to indicate location, direction, distance, areas, land and water forms, rainfall, volumes of business, distribution of crops, geographical features, such as size and shape, present economic and social data, population distribution, trends thru the periods of history, etc. They can be used to illustrate societies migrating over and settling in all parts of the world. Since one of the common uses of maps is in locating one's place in relationship to another,

[1] Johnson, Henry, *Teaching of History*. New York: Macmillan Company, 1946.
[2] Johnson, *op. cit.*

a sense of direction and distance may be learned rather early in the career of a student. Location and distance can be introduced thru the use of place charts. Namely, the location and distance of a student's home in relationship to other places of the community.

Johnson[3] suggests that place charts can be used very conveniently at the junior high school level or even before.

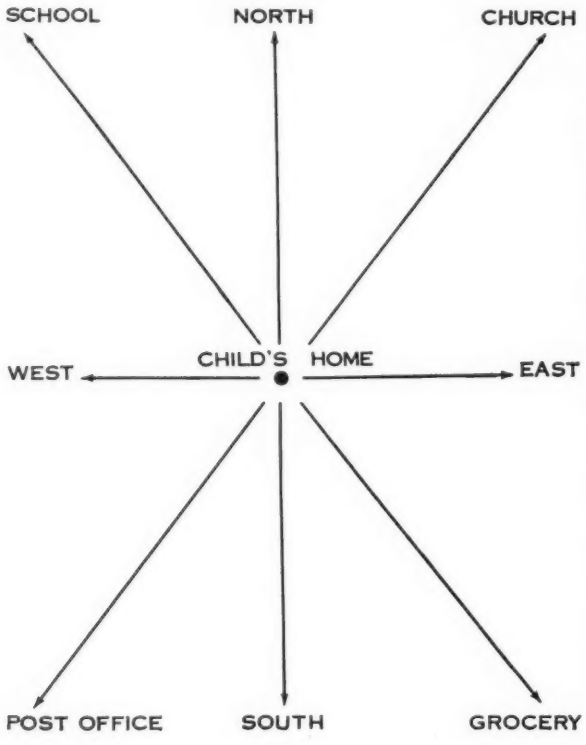

Fig. 1

To understand distance relationship the student should associate or refer to some standard reference of distance with which he is acquainted. This can be accomplished by having the student recall the distance to some destination to which he has traveled.

It is a sad commentary on American education that high schools do little or nothing with the teaching of geography.[4] It is in this area of the curriculum that considerable instruction in map work is accomplished. The writer is cognizant of the fact that geography is only one area for map work, but at the same time, it is generally the student's initial introduction to maps. To have this information or knowledge terminate at the end of the junior high school may explain the numerous misinterpretations civilians possessed concerning the distances and locations of World War II areas. Distance and direction of place relationship need to be understood by all people to

[3] Johnson, Henry, *op. cit.*

[4] Bruner, H. B., et. al. *What our Schools are Teaching;* Bureau of Publications, Teachers College, Columbia University, 1941.

have a sense of appreciation how other people live. This would appear essential if we are to establish the One-World concept of human relationships.

Some Discrepencies Illustrated by the Mercator Charts

Prior to World War II, many of the maps found in textbooks misrepresented many facts of the earth. The mercator map does not take into consideration the curvature of the earth for long distance or directions other than the distance running nearly due north and south. The mercator chart serves its most usefulness for the mariner and even he makes extensive use of the Great Circle Chart in plotting his routing from one destination to another. The Great Circle Chart illustrates the curvature of the parallels and meridians. Great Circle Charts are available at the United States Hydrographic Office, Washington, D.C., and it is strongly recommended that schools begin to make use of these charts in the instructional program. The Hydrographic Office has a significant reason to be very accurate in the plotting of these charts. The old mercator chart often found in books presented the the meridians and parallels as straight lines. When such is the case, the teacher had best turn to the globe to illustrate the curvature of the earth. "Blown-up charts" are available for all regions of the universe which are more suitable for educational purposes than many of our present maps in textbooks. The mercator map will make North America appear to be larger than Africa, altho North America is only seven-tenths as large as Africa. On a mercator projection, Greenland will be larger than South America when in reality it is only one-ninth as large. The reason for this is that the latitudes further north have greater distances between

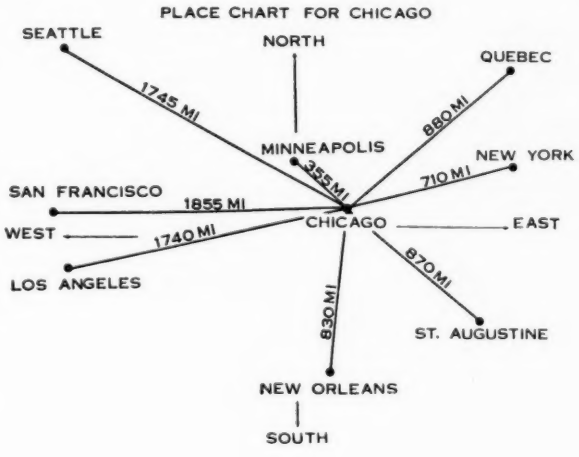

Fig. 2

them than do the latitudes near the equator. The mariner compensates for this by using plotting charts for the different latitudes, namely 6° to 12°; 12° to 18°, either north or south. The latitude lines are always held constant, while the longitude can be supplied as related to the location of the area where the navigator is at that moment. Hence, the mercator map is best left to the mariner. He understands it thoroly. Goode[5] stresses that maps used in geography texts should be constructed on an equal area projection; projection in which any square inch is representative of the same number of square miles of the earth's surface as any other square inch in the map. "Latitudes should be as they are on a globe."[6] The use of the mercator map also represents a distortion between two points on the globe. In geometry, it has been said that the shortest distance between two points is a straight line. This is not true when working with a curved surface such as the earth. Great circle routes are shorter than rhumb lines between two places on the globe. This is again true for several reasons, first the great circle is a curved line and the great circle route lies nearer to the poles than do straight lines. The distance between San Francisco and Yokohoma is 4,750 miles by the rhumb line but by the great circle line it is 4,500 miles.[7]

Maps are often used to make comparisons. If the student is to get any comprehension from the idea of comparison, he must be acquainted with some standard unit of surface or area which he can use as a reference. Even with this standard reference as a source, the student may still encounter some difficulty since the scale of measurement often varies for different maps. For example, a scale of measurement an inch long might represent one hundred miles on one map, while on another map a scale of measurement an inch long might represent five hundred miles. This can be very easily illustrated by turning to a geography textbook where one may find a page containing a map of Russia no larger than the page containing a map of Kansas. The scale of measurement used is different. This is difficult for a student to comprehend. The mariner gets around this by measuring his distances along the line

[5] Goode, P. J., *School Atlas,* Chicago, Illinois: Rand McNally and Company, 1946.

[6] Goode, *op. cit.*

[7] Mixter, G. W., *Primer of Navigation.* New York: D. Van Nostrand Company, 1941; Bowditch, N., *American Practical Navigator.* Washington, D.C.; U.S. Hydrographic Office, 1942; Bok, B. J., *Basic Marine Navigation.* New York: Houghton Mifflin Company, 1940.

of latitude, since the latitude lines are held constant. The schools will discover that plotting sheets are excellent for making comparison, since these charts are of the same scale.

Clarification of Latitude and Longitude

We often hear the complaint that students do not understand the meaning of longitude and latitude. This may be partially due to the instruction and the source material from which students attain their knowledge about latitude and longitude.[8] Howe gives the reason that students could not tell what direction Seward, Alaska, was from Nome, Alaska, was because the student had been taught that the top of the map is north. He goes on to say, "But the meridians and the parallels are curved and the correct solution calls for the knowledge that every meridian is a north-south line regardless of its curve."[9] This is the definition that prevailed at one time in geography texts for latitude and longitude. It would appear only natural that the student will become confused about the true meaning of these terms. Parallels and meridians are imaginary lines and are used to set up theoretical principles in locating the Greenwich meridian, the equator, and other great circle lines. To teach young children the meaning of latitude and longitude in terms of Howe's premise only adds confusion to them. We need to ask ourselves several questions. How frequently does the child use latitude and longitude when he is locating a place or destination? What group of people generally make most use of longitude and latitude? How do they describe it? The mariner possibly makes as great a use of these terms as does anyone, and he has derived a very workable definition of these terms which are understood by all mariners. The mariner uses longitude and latitude to locate himself at sea; he is not the least bit concerned about meridians running north and south since he does not use these terms as do the educators. Latitude to him is a position north or south from the equator. Longitude defines his position east or west from Greenwich meridian, since zero longitude begins at Greenwich; longitude is measured to 180° east and to 180° west. In short, a mariner locates himself as latitude 30° 16′ 15″ North

[8] Howe, G., "A Study of the Ability of Elementary School Pupils to Read Maps." *National Society for the Study of Education. Thirty-Second Yearbook.* Bloomington, Illinois, 1933.

[9] Howe, *op. cit.*

or South—longitude 125° 20′ 25″ East or West. With this information he can navigate himself to all parts of the globe. What then can the schools draw from this inference? It appears that they can begin with the correct teaching of the terms latitude and longitude. We have confused meridians with the exact meaning of longitude. Both latitude or longitude have reference points, namely the equator and the Greenwich meridian. Parallels and meridians are components of celestial navigation and surveying which might be better left to the students in higher levels of education.

Mathematical Geography

Another use of the map which we may have failed to illustrate properly and exactly is the relation of longitude to time. The earth rotates once in twenty-four hours and it takes the earth one hour to rotate fifteen degrees. Consequently, the earth is divided into twenty-four time zones. Each is 15° in longitude and width. Zone time (local time) differs from the Greenwich time by one or more hours, depending upon the zone in which a person is located. Students generally become acquainted with the time belts across the United States, but do they realize these time belts are related to direction and distances? Does the child who knows that the Eastern Time belt is one hour ahead of the Central Time belt, know there is a difference of 15° in longitude? Does he know that the distance in the West has earlier time than distance in the East? We are in need of teaching a phase of Mathematical Geography which is as significant as are many of the areas now included in geography.

If the schools were to begin to give more instruction in locating places by longitude and latitude, the information gained would, in itself, give the student some important facts of the various places. For example, in locating a country in the far north latitude, the student can infer some idea of the climate and begin to draw generalizations about that country.

Need for Three Dimensional Map

The regional map shows the relief, the drainage, the roads, the railways, and areas covered with forest and woodlands. Bowman says that if a climatic map is superimposed on a regional map, then a soils map superimposed upon these two, one has a three dimensional map that may show the structure of certain related

elements of physical environment. Yet this three dimensional map is a mere accumulation of facts, "Until the inches of rain are interpreted to values critical for the growth of plants, the map is not a geographical synthesis. . . ." "Unless a given soil is described in terms of moisture holding capacity, natural fertility, areal extent and prevailing temperature of the growing season, its importance to human studies is overlooked."[10] The application of climatic data can be illustrated thru the use of maps. Koppen[11] has worked out a formula in relation to vegetational distribution. Man is interested in the practical value of geographical analysis and intelligent uses of the earth, whether for food getting or for transport, enjoyment, or comfort. Man is extremely interested with climatic conditions in their relation on the population. Koppen's map denotes percentage departure from the normal. Martonne[12] has sought a close appraisal of rainfall by working out an index of aridity. A soil map, a vegetation map, a population map only provide basic data which must be interpreted in human terms. A world map of rainfall variability shows the necessity of going back to the inches of rainfall to understand what the yearly expectation of rainfall range and time occurrence may be at a given place.[13] This can be the difference between settlement and non-settlement. When the variability has been determined there remains the question in what season does the rain come.

Bowman says that the map of the world showing the water holding capacity of soils, region by region, and a rainfall variability map are two of the greatest desired elements in geographical work. Maps need to show the recognized relationships between man and his environment. Bowman indicates the need for a map that will show the association and relationship. The element of distance is not always appreciated or stressed with map work. For a community to be fifteen or twenty miles from a railroad or navigable stream or other good transportation facilities not only affects the population and land value, but the cost and quality of labor supply available, the type of crop that must be transported to the market and the season for haulage. Distance must be given a value that

[10] Bowman, I., *op. cit.*

[11] Koppen, W. and Geiger, R., *Klimkarte der Erde*, Gotha, Justus Puthes, 1928.

[12] Martonne, Emmanuel de, "Regions of Interior Basin Drainage," *Geographical Review*, Vol. 17, 1927.

[13] Bowman, *op. cit.*

will vary from region to region to show how human activity, expanses of population, development of social services, the economic activities are geared by the distances to other places.

Kipling says that as soon as men begin to talk about any place that matters, someone must go and get an atlas. The atlas habit should be encouraged thruout one's career. Topographical maps should no more be omitted from geography than the addition facts in arithmetic.

. . . "The goal for map usage is to learn the interrelationships of some of the innumerable factors which constitute the regional and inter-regional complex of life in any area. The emphasis should not be upon accumulating of facts but upon the interplay of facts of condition with respect to each other and with respect to man and his affairs, processes, and institutions."[14]

In summary, the use of maps should be on the increase in our schools, and also it would seem reasonable that geography is significant enough to our society that instruction in this area at the high school level might help to establish a closer understanding of the One-World concept of living.

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[14] Bowman, *op. cit.*

MINERAL FUEL SITUATION IN THE UNITED STATES

E. WILLARD MILLER
The Pennsylvania State College

The predominate position of the United States as a world power is due chiefly to the extent and accessibility of its power resources. The industrial output of a country is directly proportional to its energy consumption. At the present time we produce more than one-third of the world's coal, two-thirds of the petroleum, nearly 90 per cent of the natural gas marketed, and approximately one-third of the developed water power. Our consumption of power per capita is 50 per cent higher than Great Britain, more than twice that of Germany, ten times that of Japan, and more than 150 times that of China.

CONSUMPTION OF ENERGY

The consumption of energy has been constantly increasing in the United States since the earliest time. Energy in the form of primary mineral fuels and the fuel equivalent of water power aggregated about 36,000 trillion B.T.U.'s in 1947 or 60 per cent above the 1935-39 average.[1] Of this total, coal supplied 47 per cent of the amount, petroleum 30.3 per cent, natural gas 10.4 per cent and water power 12.3 per cent. The most striking trend in the consumption of fuels is the relative decline of coal which supplied 90 per cent of the energy consumed in the United States in 1900, and the increase in petroleum, natural gas and water power. In 1947 every person in the United States was assisted by the energy equivalent of more than ten tons of bituminous coal.

TOTAL ENERGY RESERVES

The energy reserves of the United States are very unevenly proportioned. All evidence indicates that the coal reserves are much larger than that of oil and natural gas. If all known reserves of energy are expressed in equivalent tons of coal of 13,000 B.T.U.'s per pound calorific value, the total of all ranks of coal amount to approximately 2,500 billion tons. The proved petroleum

[1] B.T.U.—British Thermal Unit—The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near its point of maximum density.

is equivalent in heating value to only 5 billion tons and the proved natural gas reserve to 5.2 billion tons of coal. Coal, therefore, comprises 98.8 per cent of our mineral fuel energy reserve, petroleum 0.2 per cent, natural gas 0.2 per cent, and oil shale an estimated 0.8 per cent. (Fig. 1)

Coal

Coal, first of our mineral fuels to be exploited, is the basis of modern industrial civilization. While the relative position of coal

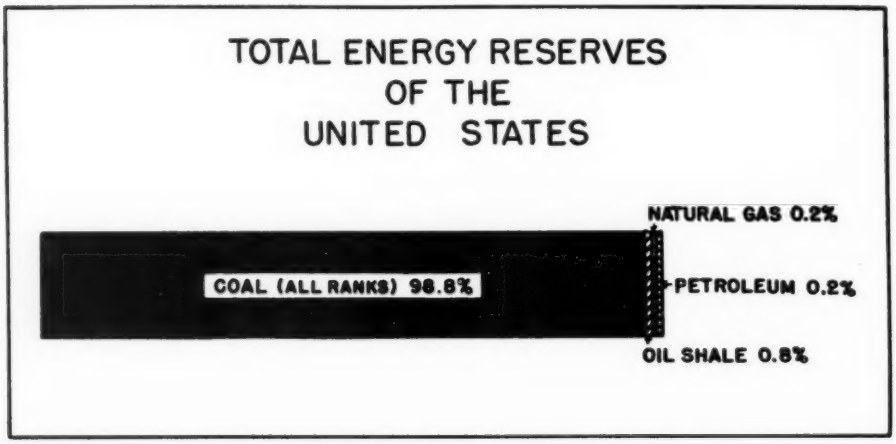

Fig. 1. Total energy reserves of the United States. Notice the tremendous predominance of coal in our mineral fuel resources.

declined as petroleum and natural gas production increased, it remains our greatest natural resource. It has made possible our highly complex industrial economy, and as the oil resources decline it will become the basis of a liquid fuel industry.

Production. After a period of declining production from 1920 to 1939 total coal production has increased from 404 million tons in 1939 to 676 million tons in 1947, a 41 per cent increase. Of the 1947 output, 619 million tons were bituminous and 57 million tons were anthracite. This surpasses the wartime peak production of 1944 by 9 per cent.

Coal production is centered in northeastern United States in the regions of the best bituminous coals. Altho 27 states mined bituminous coal in 1947, 87 per cent of the total production came from eight states: West Virginia, 26 per cent; Pennsylvania, 23 per cent; Illinois, 12 per cent; Kentucky, 11 per cent; Ohio, 5 per

cent; Indiana, 4 per cent; Virginia and Alabama, each 3 per cent. West Virginia has maintained its leadership in coal production since 1927 when Pennsylvania dropped into second place.

One of the significant trends in the coal mining industry in recent years has been the great increase in coal mined by stripping operations. The amount has increased from 30,406,000 tons in 1938 to 135,000,000 tons in 1948, an increase from 8.7 to 22 per cent of the total coal output. Pennsylvania has the largest strip production with a total of more than 36,000,000 tons in 1948.

Demands. Coal has not had an expanding market similar to that of petroleum. There has been essentially no change in the type of consumer in the last 30 years. The demand for coal has been largely controlled by the general economic conditions within the country. There are numerous research programs at the present time attempting to expand the coal market thru new uses. One of the most significant is the development of the coal burning gas turbine locomotive which made its road test late in 1948. It is believed that the coal fired gas turbine will maintain the railroad fuel market for coal which has been declining in recent years as a result of new Diesel engines. The underground gasification of coal without mining is a fascinating experiment now being developed in Alabama, and finally the possibilities of development of liquid fuels from coals has essentially unlimited potentialities.[2]

Altho production increased greatly in World War II the percentage used by each consumer remained nearly constant. The largest single consumer of bituminous coal is the railroads taking about 136,000,000 tons in 1947 or 22 per cent of the total production. Domestic heating is second absorbing one out of every five tons mined. The coke industry consumes about 15 per cent of the bituminous coal followed closely by the electric utilities with 13 per cent of the total. The manufacturing industries, including steel, consume 25 per cent of the coal mined.

Normally the United States is a small exporter of coal because of the location of coal fields far from tide water and the lack of highly industrialized countries nearby. However, largely as a result of the shortage of coal in Europe and the decline of British coal exports the United States has increased its exports from 16,446,000 tons in 1940 to 41,199,000 tons in 1946. The amount to Europe increased from 218,000 tons in 1944 to over 16,000,000 tons in 1946.

[2] "The Fuel Revolution," *Fortune*, Vol. XXXV, April 1947, pp. 98-105+.

Reserves. The most recent complete survey of our coal reserves was prepared by Marius Campbell of the U.S. Geological Survey in 1907. The original total coal reserves were estimated to be over three trillion tons. To the present time a little more than one per cent of these reserves has been consumed. This estimate of our coal reserves, however, must be interpreted with caution. A number of present authorities feel that the indicated reserves are much too high and there is a need for a modern survey.

The present figures for reserves include coals, on a tonnage basis, from the lowest to the highest rank. It also includes coals that are now submarginal, and could only be used if the better grade coals were exhausted. Coals with an ash content up to 30 per cent are indicated as commercial coals, altho at the present time an ash content half as great sets the approximate limit of mining. The survey placed the minimum thickness of mineable bituminous and anthracite at 14 inches, sub-bituminous 24 inches, and three feet of lignite. At the present time there is little coal mined that is not twice that established as the minimum thickness. All coals are included that lie to a depth of 5,000 feet, but the average depth of present mines is only several hundred feet.

On a quality basis 44 per cent of our coals are bituminous, 25 per cent sub-bituminous, 30 per cent lignite and less than one per cent is anthracite. Thus it is readily seen that a large percentage of our coal reserves are low quality. A pound of bituminous coal produces 13,700 B.T.U.'s of energy, while a pound of lignite has the heat equivalent of only 6,700 B.T.U.'s.

The geographic distribution of coal consumption has little relationship to the distribution of coal reserves. (Fig. 2) The eight states, which produce nearly 90 per cent of the coal, have less than 30 per cent of the reserves. In contrast seven western states, Colorado, Missouri, Montana, North Dakota, Utah, Washington and Wyoming have 68 per cent of the tonnage reserves, but produced in 1947 only 6 per cent of the coal. These western reserves, however, are largely sub-bituminous and lignite. Our best bituminous coals are being depleted at a very rapid rate. The reserves will be depleted first in the greatest industrial regions. The present pattern of our basic industrial concentrations is directly dependent on low cost coal. Since long distance transportation of coal makes the delivered price prohibitive, industry can not import coal as it does more expensive minerals. One may well contemplate the increased

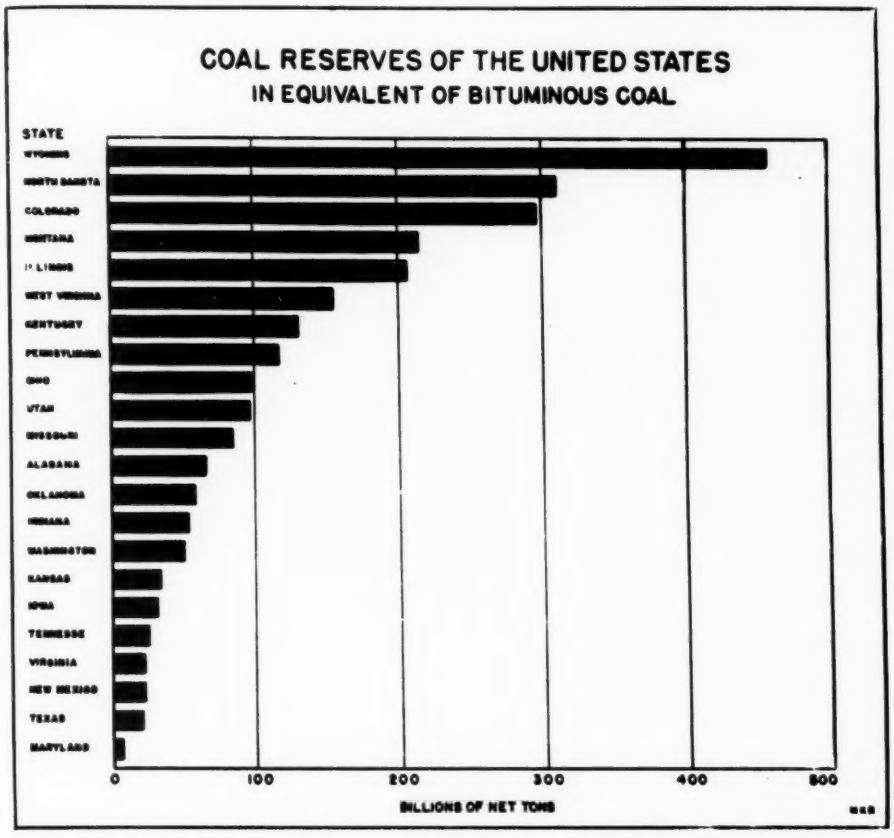

FIG. 2. In total coal reserves the western states lead. However, these coals are largely low rank.

cost of steel with the necessity of using western coals, or the far-flung problems of wholesale migration of industry in search of a cheap fuel.

PETROLEUM

Petroleum is strategic mineral number one of the present day. A natural resource committee of the United States recently states, "It is now clear that no nation which lacks a sure supply of liquid fuels can hope to maintain a position of leadership among the peoples of the world. In the final analysis, the reserves within our borders can more likely than not constitute the citadel of our defense."

Production. The production curve for petroleum, which has been constantly upward since 1859, has risen at a remarkable rate since

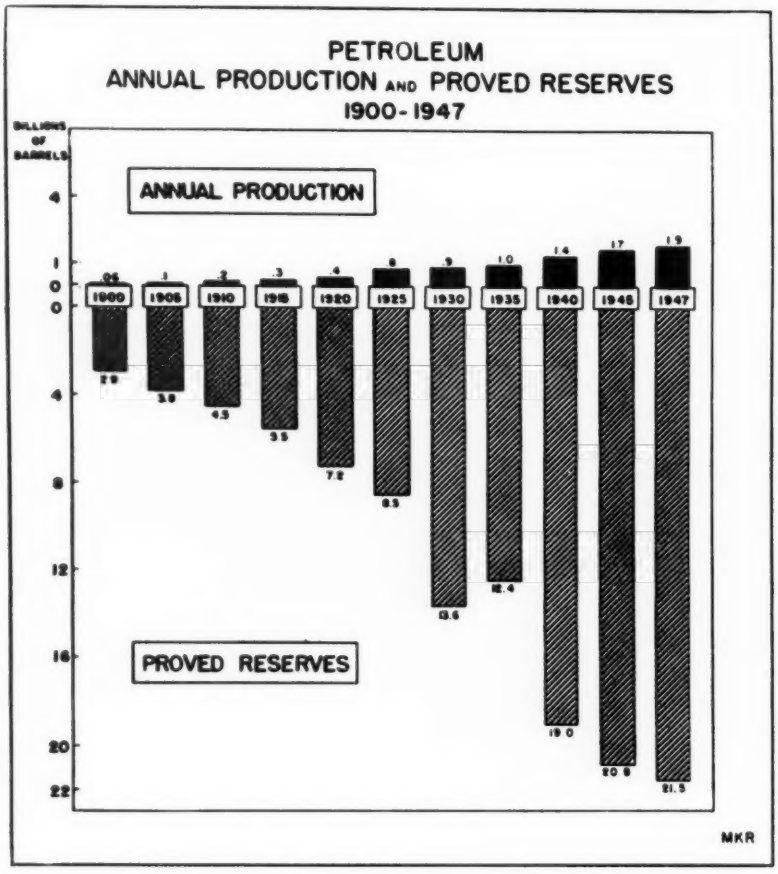

FIG. 3. Our proved reserves of petroleum have continually increased in size. At present we have proved reserves sufficient for about ten years supply at the 1947 rate of production.

1940. (Fig. 3) The total domestic production for 1948 was approximately 2,000,000,000 barrels. This production compares with 1,853,000,000 barrels for 1947; 1,772,000,000 barrels in 1945, the wartime peak, and 1,485,000,000 barrels in 1941, the last prewar peak year. The present production is at a rate of 636 gallons a year for every person in the country. This figure is an increase of 172 gallons, or 37 per cent, compared with the 464 gallons per capita consumption in 1941. The United States is now using more oil than the entire world did ten years ago. On a per capita basis it is using about 28 times as much oil as consumed by the rest of the world.

Altho petroleum is produced in 26 states, three states produce

over 70 per cent of the total amount. Texas with a production of over 900 million barrels produces 45 per cent of the total output. California is the second largest producer with about 18 per cent, and Louisiana is third with 8 per cent. While 13 states produce oil east of the Mississippi River, their total is only 8 per cent of the nation's output. Since 60 per cent of the motor fuel, 80 per cent of the kerosene, 50 per cent of the distillate and residual fuel oil, and 75 per cent of the heating oils, are consumed in the industrialized east, there is a tremendous problem of distribution.

Demands. Altho production in the greatest in our history, we did not produce enough to supply the demands of 1948. For the first time in 25 years the net imports averaged 100,000 barrels daily more than the exports. The demands for all oil products have increased remarkably in recent years.[3] The 1948 gasoline demand was 913,000,000 barrels, an increase of 31.4 per cent compared with 1941. This rise is partly due to an increase in the number of vehicles from 34,842,847 in 1941 to 37,883,265 on January 1, 1948 and in the increase of commercial airplanes from 370 to 810 in the same period. Gas oil and distillate fuel oil consumption by utilities for gas enriching purposes, home oil burners and for Diesel engines was approximately 382,500,000 barrels in 1948, an increase of 101 per cent over 1941. Installations of oil burners for central heating in homes has risen greatly in recent years. On March 1, 1948 there were 3,711,791 oil burners in operation, an increase of 31.6 per cent compared with the 2,821,044 at the end of 1946. The use of Diesel engines by railroads, industry, buses and trucks, exclusive of those for military use as of January 1, 1948 totaled 137,000. Diesel motors alone used 75,000,000 barrels of oil in 1948. Farm incomes have been high during the present decade and the farmer has been able to purchase new equipment such as tractors, stationary engines, and other mechanical tools. The number of tractors has increased from a prewar total of 1,890,000 to over 3,000,000 with an annual consumption of gasoline increasing from 39,100,000 to 67,857,000 barrels. This is an increase of 73 per cent in seven years. The military needs were estimated for 1948 at about 90,000,000 barrels which was more than seven times the amount needed in 1941 when 12,000,000 barrels were consumed.

Reserves. Altho there has been a peak demand for petroleum,

[3] "Current Facts on Petroleum, Supply and Demand," Oil Industry Information Committee, New York, 1948.

reserves are at an all time high in the United States. The unprecedented demands for crude have been met by the greatest exploratory and drilling campaign in the history of the oil industry. On January 1, 1948 the proved petroleum reserves of the United States totaled 21,487,685,000 barrels plus 3,253,975,000 barrels of natural gas liquids making a total of 24,761,660,000 barrels of liquid hydrocarbons available. Proved reserves include both drilled and undrilled areas. The proved drilled reserve in any pool includes the oil estimated to be recoverable by the production system now in operation, whether primary or secondary, and from the area actually drilled on the spacing pattern in vogue in that pool. The proved undrilled reserve in any pool includes reserves under undrilled spacing units which are so close, and so related, to the drilled units that there is every reasonable probability that they will produce when drilled.

Texas has the largest reserves with 14,765,000,000 barrels or 56.7 per cent of the United States' total. This is sufficient for 16 years' production at the 1947 rate. California, which is second in both production and reserves, has 14.6 per cent of the total proved reserves. This is, however, only 10.3 years' production at the 1947 rate. The California producers are greatly concerned at the relatively small reserves in proportion to their production. Louisiana and Arkansas are third and fourth respectively in both production and reserves. Wyoming which is fifth in proved reserves has sufficient oil for 17.3 years' production at the 1947 rate. This is an indication that the Rocky Mountain Province has important future potentialities. The old producing states of Pennsylvania, New York, Ohio and West Virginia have either declined in reserves or remained stationary. At the present time 94.5 per cent of the petroleum reserves of the United States lie west of the Mississippi River.

OIL SHALE

The oil shale deposits of the United States have received little attention to the present time. However, a survey in 1928 indicated a reserve of 92,000,000,000 barrels of recoverable oil. The shale deposits are largely concentrated in western United States. Surface and near-surface saturated sands and shales hold quantities of petroleum for future extraction.

Only two small plants have come into commercial production

using oil shales. Oil shale operations, in order to be profitable, will have to be conducted on a large scale involving capital outlays of millions of dollars. Since the cost of production is considerably higher than for crude oil, the extensive development of the oil shale reserves will not begin until the present supply of petroleum is definitely on the decline.

Natural Gas

The uses of natural gas as a fuel and an industrial raw material have increased greatly in recent years. Natural gas is referred to as the perfect fuel because of its high heat value, the ease of accurate control, and the lack of residue when burned. In recent years its conversion into liquid products has been made possible at a cost that approaches those for similar products from competitive petroleum sources.

The natural gas marketed in the United States has risen from 2,700 billion cubic feet in 1941 to 4,400 billion cubic feet in 1947. This great rise in production has been due to new discoveries, new uses and the construction of long distance pipe lines.

While natural gas is produced in 25 states, there is a concentration of production in the southwest and California. Texas is the largest single producer with about 51 per cent of the total in the United States followed by Louisiana with 14 per cent and California with 11 per cent.

Of the gas produced, about 66 per cent is marketed, 16 per cent is used to repressure oil fields or stored in the ground and 18 per cent is lost. This great loss is due primarily to lack of facilities to handle production particularly in oil producing regions. Of the marketed natural gas 78 per cent is consumed by industrial users for the manufacture of carbon black, production of liquid fuels, fuel for cement plants and public utilities. Domestic consumption is the second largest consumer taking 16 per cent of the total marketed gas. Commercial establishments consume the remaining six per cent of the available gas.

While production has increased the natural gas reserves have kept pace going from 85,000 billion cubic feet on January 1, 1940 to 165,927 billion cubic feet on January 1, 1948. In recent years, however, there appears a tendency for reserves to level off. While the 1947 production of natural gas was 13.9 per cent greater than 1946, the proved reserves increased only 3.3 per cent. As a result,

the total year's supply decreased from 39.7 to 37.7 years. Current trend toward fewer years supply of natural gas reserves has some highly significant implications. If the gas industry is to meet its increasing demands there must be less waste and a highly developed exploratory and development program in the near future. The present trend in gas reserves does not justify too much encouragement over currently proposed synthetic plants for making natural gas into liquid fuels.

SYNTHETIC LIQUID FUELS

As our demands for liquid fuels increase and indications show that our petroleum and natural gas reserves are limited, there is a growing interest in the development of synthetic liquid hydrocarbons. It is, however, evident from a review of the coal reserves of the United States that ample supplies are available for the gaseous and liquid fuels needs of our country for hundreds of years when the natural gas and petroleum reserves are exhausted. In the 1930's two processes were developed commercially in Germany for the direct production of synthetic liquid fuels. These are the coal-hydrogeneration or Berguis-I. G. process and the gas synthesis or Fisher-Tropsch process. Liquid fuels such as gasoline, diesel oil, fuel oil, and other hydrocarbons are primary products of either process.

The coal hydrogeneration process uses high volatile bituminous, sub-bituminous and lignite coals as raw materials. Lower yields of liquid fuels are obtained as the volatile matter of the coal decreases. From a conservation viewpoint this is fortunate for the high volatile coals comprise 97 per cent of our entire coal reserves. The low volatile coals are needed for coke and metallurgical purposes. The high volatile, poor coking coals of our midwestern and western states could be readily liquefied. In initial tests by the United States Bureau of Mines, it was found that approximately 0.6 tons of bituminous coal are required to produce one barrel (42 gallons) of gasoline. Progressively larger quantities of coal are required as the rank of coal decreases. For sub-bituminous the requirement is 0.9 tons and for lignite 1.2 tons. The products produced by this process are high quality. The gasoline has a 92 octane value when treated with tetraethyl lead and is suitable for aviation uses. A pilot plant is now in operation in Library, Pennsylvania to develop commercial operations in this country when the

need arises. At the present time it is estimated that a $120,000,000 plant will be able to consume in one year 6,000,000 tons of coal and yield 96 billion cubic feet of gas, 2,700,000 barrels of gasoline, 330,000 barrels of Diesel and fuel oil, and 8,000,000 gallons of industrial alcohol.

The gas-synthesis process has a wider application in the use of raw materials. Almost any carbonaceous material can be reacted with steam to produce carbon monoxide and hydrogen, which in turn are reacted with each other to form liquid hydrocarbons. Raw materials include, all ranks of coal, coke, coal gas, natural gas, charcoal, wood and other vegetable matters. Natural gas is the material receiving most attention in this country to date. Pilot plants are now in operation in Kansas and Texas to determine the feasibility of commercial production. It is now estimated if natural gas costs five cents per 1,000 cubic feet, the cost of gasoline will range from five to nine cents per gallon.

Conclusion

While the mineral fuel reserves in the United States are still extremely large, we are depleting our resources more rapidly than any other country. Shortages in certain types of fuels are beginning to appear, and there is a growing demand for the development of a synthetic hydro-carbon industry to supplement natural petroleum. In order to meet our growing demands one of the first steps should be a comprehensive survey of existing reserves and the possibilities of their development under existing economic conditions. Only after these data are secured can a sound mineral fuel exploitation policy be developed in the United States.

THE PANAMA CANAL SCHEDULED FOR A MAJOR OPERATION

W. O. Blanchard
University of Illinois

Few events have so profoundly disturbed our sense of national security as did the bombing of Hiroshima and Nagasaki. New and powerful weapons—the atomic bomb, the guided missile, the "block buster"—these, and many others—have written the ominous sign: "*Out of Date*" on many of our defense installations. Military leaders have warned us of the extreme vulnerability of our highly strategic outposts—among them the Panama Canal.

Congress Acts

Gathering war clouds in 1939 had already spurred an apprehensive Congress to action. It authorized the construction of a third set of locks near the Canal terminals to be located at some distance from those already in use so that all of them would not be destroyed by a single bomb. Likewise these new locks were to be "large enough for all future needs." Again, it was a case of "too little and too late." The project was expected to be completed by 1945; but after three years of work and the expenditure of some $75 million it became evident that it could not be finished before the war would end. The work was stopped and men and machines turned to more urgent needs.

The close of World War II afforded an opportunity for more careful planning. Shortly after V-J day Congress authorized the appointment of a board of experts to review the whole problem of an interoceanic waterway. Their report was made in 1947.

The investigations of this group were to be most comprehensive. It had the advantage of much data not available when the present canal was built. The experience of constructing the lock waterway and of operating it for thirty years, the added knowledge of tropic health and sanitation, the details of the geology of the formations to be cut, the effect of changes in the shipping world and the revolution in methods of modern warfare—all these were to be considered. The board was directed to study other sites, to consider remodeling the present structure, to reckon the feasibility of operating two canals instead of one, to weigh the relative merits of a sea-level and lock type. In fact, it was to make *all* studies

necessary to recommend the kind of project which would furnish both the service and security required for decades to come.

The Present Lock Canal

The present canal was planned and built amidst much controversy, both political and engineering. One of the major problems was to determine the best type of canal. Should it be a lock structure or a sea-level waterway? The choice of the first was largely due to the fact that this type would be cheaper and could be built in a much shorter time than one at sea-level.

On the whole the canal has functioned very satisfactorily. Except for slides in the Gaillard Cut shortly after the opening, there has been no serious interruption of service. The only major change in the plan was the construction of another reservoir—Madden Lake—built for increasing the water supply.

In principle the present canal operation consists in raising vessels some 87 feet above sea level, crossing an artificial water (Gatun Lake) and then lowering the craft to the ocean at the other terminal.

The locks are large enough to accommodate all *commercial* vessels, except those of the Queen class, and these would not use this route anyway. All sorts of accommodations have been provided—fuel, repairs, supplies—so that it might be regarded as a "glorified filling station" on a busy ocean highway. Toll charges have been reduced to modest proportions and the savings over the route about the Horn have been so large that it has taken over almost all of the latter traffic.

How About the Future

The projection of the traffic curve (Fig. 1) suggests that by 1960 there may be some congestion on peak load days. Subsequently, as traffic increases, delays will become more frequent. To remodel the present canal to care for all commercial demands—at least until the year 2000—would, it is estimated, cost about $130,000,000.

Strategic Considerations

But the canal is more than a vital commercial link. It is a highly strategic unit in our national defense. It is in this latter role that the waterway has given our military leaders cause for serious concern.

Panama fails in two important respects to measure up to present military requirements. (1) It is highly vulnerable to attack by modern weapons. Some military authorities believe that if Japan had followed up its success at Pearl Harbor by an attack on Panama, it might conceivably have destroyed the locks and drained the canal and lake reservoirs into the oceans. (2) A second complaint—this from the Navy—is that the size of our naval units constructed has been for years limited by the dimensions of the

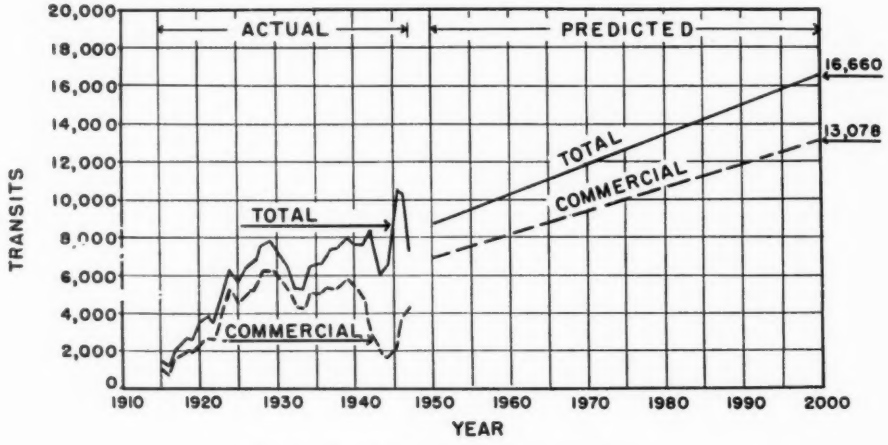

FIG. 1. Canal Traffic—Past and Future

After J. H. Stratton, The Future and the Panama Canal, Am. Soc. Civil Eng. Proc. Apr. 1948.

In peacetime, about 4 out of 5 transits are ocean-going commercial vessels; the balance is toll-free traffic. This latter is made up of (1) U. S. and Panama government vessels; (2) warships of Colombia; (3) vessel transiting solely for repairs; and (4) those used for operation and maintenance of the canal.

Panama locks. Plane carriers, or "flat tops," were non-existent when the canal was built and this type of vessel requires a waterway of extraordinary width.

Two additional minor weaknesses in the present canal performance should be mentioned. The periodic overhauling of the locks requires that one lane of these locks be closed to traffic during that time. Further restrictions on capacity are sometimes caused by radiation fogs in the Gaillard Cut during the rainy season. These latter at times have necessitated closing that section to traffic after midnight. To minimize these difficulties the overhaul job is scheduled during the dry season when fogs are at a minimum

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and round-the-clock operations are feasible so that traffic is not held up for long.

Panama's record during the two world wars certainly justified its rating as a number one defense sector. During the first struggle, it enabled the all-important Chilean nitrate to move to the Allied munition plants, as well as making numerous Far East strategic materials available. In World War II it transited some 17,000 ships (1941-1945), mostly naval craft and supply vessels. It has been estimated that without the canal, this traffic service would have cost $1½ billion more than it did. This includes the cost of escorts for the long trip via Magellan.

The task of restudying the whole problem was carried out by a distinguished group of scientists—mostly engineers. The work was thoro and painstaking. Some twenty-two possible routes were investigated, other sea-level canals, e.g., Cape Cod and Suez, were visited for operation data. Extensive tests were made in the testing basin in Maryland and in another model basin constructed on a scale of 1:100 in the Canal Zone. These tests were checked against mathematical computations for such data as the effect of bombs on the channel and banks, the influence of channel shape on the currents developed, the speed of vessels in transit, and the behavior of ships in restricted water under various conditions likely to be found here.

The Panama Canal, 1960 Model

The report of the board contains a number of recommendations of geographical interest, such as,

1. The most practical site is in the Canal Zone and it coincides in part with the present canal channel as shown on the map. The proposed route, it will be noted, is considerably more direct than the old one (Fig. 2).
2. A sea-level canal is recommended, chiefly because any lock-type is vulnerable to attack and possible destruction by modern weapons.
3. Much of the proposed channel is to be located to one side of the present waterway so that excavation can be carried on without disturbing present traffic. In fact, it is estimated that a suspension of activity will be necessary for only about a week during final conversion.
4. The new channel will have a capacity sufficient to handle any anticipated traffic, commercial or military, without delay.

5. This type of canal introduces the problem of currents which add to the difficulty of navigation in the channel, currents due to either tidal or tributary drainage variations. Tributary streams which fluctuate enormously with the seasons will not be allowed to enter the canal. They will be diverted to the oceans direct or into large storage reservoirs as shown in the sketch map.

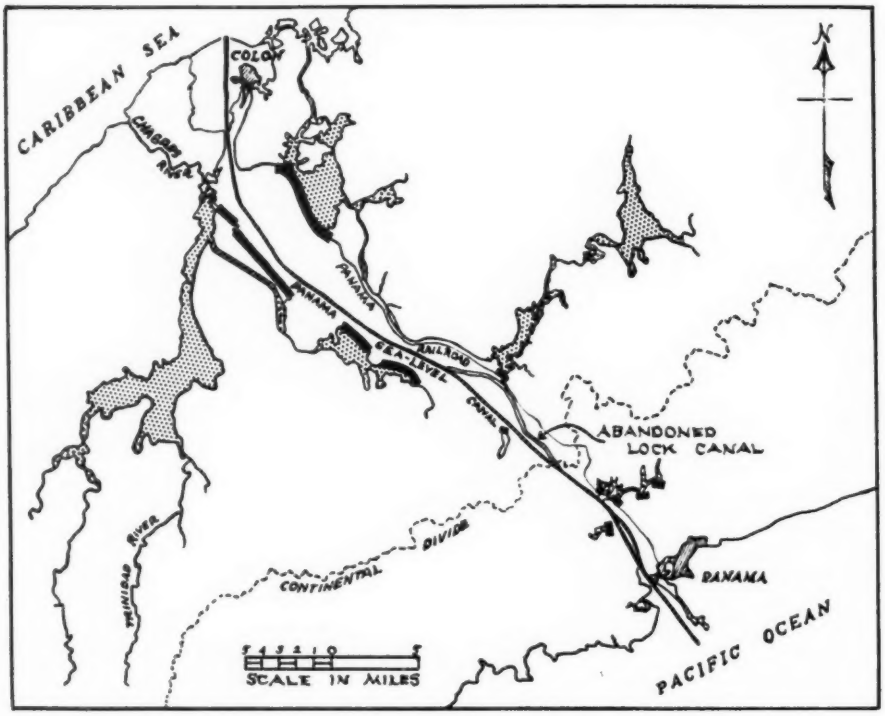

FIG. 2. Flood Control for the Proposed Sea-Level Canal

After J. H. Stratton, The Future and the Panama Canal, Am. Soc. Civil Eng. Proc. Apr. 1948.

Note the proposed elaborate system of dams (solid black), the reservoirs and diversion channels (stipple) to control the fluctuating runoff. The part of the present lock canal to be abandoned as well as the railroad across the isthmus is shown. The navigable pass and tidal lock to control tidal fluctuations will be located near Panama City.

The Pacific tides have a maximum range of 20′; the Atlantic, about 2′. This difference of level could produce a maximum 4½ knot current, which would reverse every six hours. Control is proposed by having a tidal lock and a navigable pass with a supplementary gate near the Pacific

terminus. The latter would be used when tides are at or near mean and the current therefore is negligible; when the tidal difference is large, the tidal lock would be used. This arrangement would limit the maximum current to 2 knots, and it is expected that the pass could be open ⅓ of the time. Even a 4½ knot current would not stop most traffic. Thus, if the tidal lock was destroyed, the navigable pass gate could be quickly removed and traffic operated on an open channel basis without great risk.

6. The problem of slides would, of course, be rendered more acute by the greater depth required in a sea level type. However, this danger can be met by appropriate lowering of the angle of slope of the banks. Past experience has shown the character of the material in the cut to vary widely, both vertically and horizontally, so that no uniform slope is practical. Each section must be adjusted to its own particular angle of repose. The slopes will be dredged to produce stable conditions from the start and not wait for slides to reveal grades too steep.
7. The time required for construction of the new waterway is estimated at ten years. The labor force at the peak period will be some 41,000. About two-thirds of the labor will be unskilled and can be recruited from in and about the Caribbean. The skilled and technical force as well as the cement, steel, and lumber will have to come from the United States. The total excavation will be about three times that required for the present canal. The cost is estimated at 2.5 billion dollars.
8. By the year 2000, it is estimated that there will be 13,078 transits annually, or an average of 46 daily, rising to 69 on peak load days. Boats will move between 8 and 12 knots so the time of transit will be about 4.5 hours instead of almost 8 as at present. The new proposed depth of 60′ as compared with the present 42′ will allow this greater speed. The channel width recommended is 600′.

The decision is now up to Congress. Reduced to its simplest terms, the question is this: Is the added safety factor to be secured by converting to a sea-level canal worth $2,500,000,000? The answer should be clear. Since the canal is necessary in war as well as in peace, in our troubled world it would seem to be economy in the long run to make the project secure.

USING STILL-PICTURES IN GEOGRAPHY

DOROTHY O. VEGTER
Central Junior High School, Muskegon, Michigan

Good teachers of geography have always realized the values of visual aids. Movies are the most popular with the students. Strip-films and slides are popular with many teachers because of the advantage of being able to hold one scene while discussing it. This article will deal with the collection, preparation, and use of still-pictures. Their chief claim to popularity is in their availability. They are readily available to the teacher from many sources and they are at hand for immediate classroom use.

SELECTION AND PREPARATION

Probably the best source of good pictures is the *National Geographic Magazine*. *Life* and *Holiday* magazines have provided a surprising amount of good material. Recently the pictures in *The United Nations World* have improved in both quality and quantity. This is only a partial list of sources and each teacher doubtless has additional sources of really good photographic material.

As pictures are acquired they should be mounted. Oak tag and scotch tape are the only materials needed. Uniform size of mounting is desirable regardless of the size of the pictures. Whether or not the caption is left on depends upon its value. When it is left a significant word or sentence may be underlined for emphasis. The teacher's name in the lower corner has a good effect on the children. When they are aware that they are using material which is important to someone else they are more likely to use it carefully. When both sides of a picture are equally good the picture may be creased to fold back and the instruction, "Lift, see other side" may be lettered at the bottom. Such pictures should be numbered A and B as well as with the number of the picture. If the number is placed at the top it will be easier to select a desired picture from the folder when it is in the filing cabinet.

FILING THE COLLECTED PICTURES

There are several ways of filing the mounted pictures depending on the course of study. If the basis of the unit to be taught is Nations they can be numbered and filed according to countries. Or they may be grouped according to Regions if that is the basis

of the course. However there are many pictures which will be used again and again to illustrate specific items such as surface, natural vegetation, native animals, etc. when introducing geography in the elementary grades or when reviewing certain concepts at any grade level. To have the desired pictures available to illustrate any such item the writer has found the following system of filing satisfactory.

In our present course of study the units are based on Nations. All pictures of a certain country are numbered and placed in a folder. A record is kept in a notebook. The number and the significant information found in each picture are entered in the record. An example of an occasion when pictures from several different sets may be utilized to illustrate a definite type of information is as follows: types of natural vegetation are being taught. The record shows that pictures illustrating rain forest, steppes, evergreen forest, the veldt, and hardwoods can be found in pictures Belgian Congo 12, U.S.S.R. 29, Canada 7, South Africa 21, and Michigan 5. Just these pictures need to be removed from the files for the discussion.

Besides the above-mentioned natural vegetation various other topics for special discussion may be illustrated by selecting suitable pictures. For example, types of homes, holidays and festivals, interesting customs, kinds of work, racial characteristics of various nationalities of people, etc. Some pictures may display more than one significant idea which can be called upon to make clear the concept or information which is being taught. When the pictures have been cataloged and recorded at the time of filing, the teacher can find material to illustrate the lesson with speed and ease.

Using the Pictures

During the assimilation stage of a unit as many pictures as possible should be shown. Having enough to circulate the pictures among the whole class, at one time, is desirable. The student keeps notes of "Facts from picture-study" recording the number of each picture and the important facts he learns from it. Younger pupils enjoy voting on the pictures from which they learned the most and making a bulletin board display of the chosen ones. A student or committee making a special report selects pictures to illustrate the report. Another activity may be the sorting of a set of pictures into smaller groups to show scenes in a special

region or area of a country. For example, all the views of Brazil may be examined to find those of the Amazon Lowlands, the Brazilian Highlands, and the Interior Plains.

During the interpretation stage of a unit the pictures may be reviewed to find those which explain, "Why the people live as they do in the region being studied." The class will find some scenes in which man is using his environment as he finds it, and others in which there is evidence that man has changed or adjusted his environment to fit his needs. In the first group will be lumbering, grazing, water transportation, etc. In the second group will be dams, irrigation, terraced hillsides, breakwaters, etc. Such a use of the pictures enables the student to interpret decisions arrived at during class discussion.

Some pictures may be selected for use in testing. One method for using them in this way is as follows: Scenes showing outstanding characteristics of the people, their typical activities, and dominant aspects of their natural environment are mounted without captions. The class is asked to identify the region or country. Air views of cities such as Rio de Janeiro can be used in this way. The skyline of New York, the Golden Crescent of Pittsburgh, the Golden Gate at San Francisco; these and many more can be used in an identification test. Another set may illustrate the relationship between man and his environment and be used to review reasons why people live as they do in certain places. Each teacher will have her favorite way of using pictures in testing and the above are only a few suggested procedures.

The advantages of using still-pictures are sufficient to offset the labor involved in preparing a file. When a movie arrives we make use of it gladly. The showing of a strip-film is a stimulating occasion for the class. A trip to the visual-aids room to view a set of slides is worth the effort and the break in routine. But the lowly still-picture, like a faithful friend, is always with us, and with careful handling can be with us for a long time.

WHY NOT A GEOGRAPHIC EXCHANGE CLUB?

JOHN W. CONOYER
St. Louis University

Have you ever had the pleasant childhood experience of swapping—marbles for a top, kite string for a ball, an apple for an orange, a ham sandwich for gingerbread? If so, memories take you back to elementary school days in some rural area where deals were consummated during "noon-hour recess" while the contents of the "dinner buckets" were being consumed with gusto. Your past experiences, if answered in the affirmative, have been truly American—a carry-over from the pioneer days when money was scarce and commodities were exchanged by barter alone.

An occasional swap or exchange between youngsters, if carefully studied as to value and possible use of the proposed article, is a wholesome thing—a first step in the field of juvenile diplomacy. However, promiscuous trading of goods becomes a cancerous habit, and the habitual trader will often receive worthless articles, merely because he is eager to "make a trade."

THE GEOGRAPHIC EXCHANGE CLUB

The idea of wholesome and carefully planned barter could be carried on in connection with grade school and perhaps high school geography thru the activities of a "Geographic Exchange Club." The purpose of such an organization would be to stimulate interest in (a) local geography, and (b) the geography of the United States as a whole.

In the first instance, the children must know their home community, county, region or state to learn what articles they would have to offer boys and girls living in the many other states and regions found within the United States. On the other hand, they would study neighboring states and regions as well to learn the commodities that they would like to receive by way of return.

As to club organization, the procedure could be held to a minimum, for conciseness and simplicity will avoid much of the "red tape" in which many school club members find themselves entwined. A few rules and regulations relative to club purpose and function should be adopted and the usual officers chosen.

The chances of the club's success depend largely upon the

thought and careful guidance of the club's sponsor (the geography teacher) and his or her careful planning in the "trying early days" of the club's life. After the pupils have begun to check data, write letters of inquiry and proffer, and especially after they have begun to receive and study various articles from students in neighboring regions, interest will soon reach an "all-time high."

Value of the Club

In Classroom Procedure. The study of geography thru club activities would cease to be "textbook study" alone. Field trips in local areas would be organized to study rocks, minerals, soils, and other geographic resources that might be offered to boys and girls living in other regions. Pupils, by becoming active participants in a wholesome geographic project would feel that they were really a part of the country that is their heritage. Moreover, they would learn to know what children of Florida, Maine, North Dakota, Arizona, and other states would have to offer. And by applying the geographic "why" to the "where" of these commodities they would be certain to learn to know the United States! They would find that ours is a country of regional specialization.

In Correlation with Other Subjects. Contact with children in other schools, perhaps a cousin living in Louisiana, a friend in Wisconsin, must be made by writing, and to many letter writing is a lost art. Moreover, it becomes a "gruesome thing" to some children (boys especially) of the upper elementary and high school years. *But here we have letter writing with a definite purpose in mind!* And to a Missouri boy who would write to a cousin in Louisiana telling him of the newly formed club, requesting the cousin to organize a similar one, and then offering to exchange a pound of Missouri hickory nuts or several specimens of tiff (barite) for a bundle of Spanish moss—this would be a pleasant experience, indeed. Hence, a new interest in letter writing!

Further procedure would involve the study of proper packaging and wrapping of parcel post articles (another lost art, as the postman will attest during the Christmas rush), the knowledge and application of the words "Fragile," "Perishable," "Fourth Class," and the like. A study of parcel post zones and rates, and also familiarity with state quarantine laws will further add to the value of such interdepartmental correlations.

Specific Examples of Exchange Articles

Soils. Some of the upper grade boys, especially in rural areas, will be interested in soil collections and a detailed study of these various soils after the collection is made. For example, a boy in northwestern Arkansas would offer samples of cherty limestone soils from his community in exchange for black soils of northeastern Kansas, red soils of the Oklahoma-Texas Red River Valley, or muck soils of the Mississippi Valley, only to mention a few.

Minerals. Most students find mineral collections interesting. For example, children of northeastern Georgia would have prize offerings in collections from the marble quarries to offer in exchange for Florida phosphate, Arkansas bauxite, New Hampshire granite, Maine slate, Indiana limestone, Pennsylvania anthracite, Oklahoma zinc, Nevada copper, or Texas sulphur, again to mention only a few.

Products of the Forest or Orchard. After having studied the value and purpose of state quarantine laws, articles such as pressed leaves or blossoms, cuts of wood, pieces of bark, nuts, pine cones, and even semi-ripened fruits (if chosen with care and properly packaged) could be sent by way of exchange. For example, Texas pecans might be exchanged for California walnuts, a Florida coconut, Gulf Coast tung nuts, Great Lakes birch bark, small cuts of walnut and cherry wood from the Central Hardwood Belt, or a specimen of California redwood.

Products of the Field. Children of our American "South" would have much to offer in a branch of ripened cotton in exchange for Louisiana-Texas rice, Kansas wheat, Iowa corn, California barley, Ohio buckwheat, Minnesota flax, or central Nebraska kafir—again to mention only a few possibilities.

Other Products. And certainly a girl from Arkansas would be happy to exchange a small jar of strawberry preserves (perhaps a part of her own 4-H project) for a similar container of Vermont maple syrup, Salt River Valley honey, Missouri sorghum molasses, Illinois corn syrup, or Louisiana "black molasses."

Other articles with great exchange appeal would be of the miniature or souvenir type—but here cost should be definitely held to a minimum—tiny articles of pottery, miniature cotton bales or bags of flour, small canoes or snow shoes, and the like.

CONCLUSION

But, we might ask, could not such a well-meaning club fail to achieve its purpose, and therefore become a waste of time?

The dangers of possible failure are several: *First,* that the purposes of the club are not clearly understood. The club must be a tool for better teaching and learning in the field of geography. *Second,* that proper guidance, thought and planning be directed toward the club activities. *Third,* that adequate collections of various kinds be made so that interests of all the students be taken into consideration. *Fourth,* that proper preliminary study of regional production or occurrence of the article be accomplished before a request is made for it. *Fifth,* that proper "follow-up" study is done after the article has been received.

Let us take a specific instance to illustrate the above possibilities for club failure. Consider a jar of honey sent by a group of students living near Phoenix, Arizona. If the honey is received and merely placed upon a shelf or "passed around" and sampled, the project is a failure. But if, before receiving it, the students begin to read the life history of the honey bee, its habits of industry and frugality, then observe, if possible, its activities among flowers (and employing the necessary precaution of a hands off policy), and finally upon receiving it, note the color of honey made from desert flowers as this specimen might show, as compared to honeys made from clover, smart weed, buckwheat blossom, and other humid-area blossoms, then the project becomes a success.

COSTS AND CONCLUSION

And what of the cost of these projects, we ask? Is not the undertaking an expensive one? My answer is that the cost need not be great and might well be covered by a membership cost of a nickel a week, depending of course upon the number of club members enrolled (*and paying*). And the value received by way of added interest in the field of geographic study would show the results of a little money well spent. For the entire year the total cost involved would not equal the amount of money our well-meaning school board has invested in the "nice big globe" (as the visitors call it), now collecting dust beside the "stand dictionary" (or is it behind the door?)—forgotten and unused. Teachers, let's give the Geographic Exchange Club a trial!

TEAK—TROPICAL HARDWOOD EXTRAORDINARY

A. D. PERFETTI
University of Illinois

Scattered thruout the monsoon forests of southern Asia and the East Indies is one of the world's most valuable trees—the teak. Almost everlasting, this wood defies the ravages of time, weather, termites, and even resists fire. One thousand years is not an uncommon age for teak beams supporting Indian temples, yet they remain in perfect condition without preservatives.

Tho cost limits its use in this country to shipbuilding and novel furnishings, this versatile wood ranges in use locally from fuel to furniture, from railroad bridges to temples. It works easily and takes varnish and polish. The wood, however, is brittle, requiring the preparation of holes for nails, and it is too oily to glue.

Importing countries use teak chiefly for marine construction, especially ship decking, for which it is unexcelled. It wears uniformly smooth and does not shrink, crack, or warp. Moreover, it can be used in conjunction with iron without danger of corrosion.

Tho of commercial importance only in the Far East, where it is indigenous, teak is now cultivated in Africa and the Americas. The map shows the extent of natural forest areas. They occupy bordering uplands rather than river valleys. Found in low hill regions up to 3,000 feet, it occurs in small groups or as single trees, averaging three or four per acre. Optimum mean annual conditions are temperature between 75° to 80° F. and precipitation of 50 inches with a pronounced dry season. Thoro drainage is the one indispensable soil requirement for well-formed trees.

Most commercially exploited trees are 2 feet in diameter and 120 feet high with about 30 feet of clear trunk. Buttressed trunks 8 feet in diameter and 150 feet high may develop under ideal conditions.

The deciduous leaves, 18 by 24 inches, resemble tobacco leaves in shape. The gray bark is one half inch thick. The sapwood is white, while the heartwood is golden yellow, becoming mottled brown when dry. It retains its aroma, like old leather, to a great age. With respect to strength and weight, teak is comparable with oak; however, when green, teak will not float.

The tree is readily cultivated on plantations due to its fast rate of growth, about four times that of oak, reaching commercial size

in about 80 years. Wild trees may require twice this growing period due to the retarding effect of forest fires.

Governments of the major producing countries own and manage the forests, leasing certain areas to large corporations for exploitation with a royalty charge. Official foresters mark and girdle the trees about three years before felling. This kills them and they become dry and light enough to float to the saw-mills. Elephants pull the logs to the dry river beds where they await the summer monsoon. We see this being done in Fig. 1. Just beyond the elephants is a small stream which swells with the first rains of the season and floats the logs to the main river. There they are made into rafts and finally, after a journey of several months, reach the sawmills.

Fig. 1. Dense undergrowth, as in the background, coupled with rough terrain prevent widespread use of mechanized transportation. (Compliments of Mr. Tun Kyaw, Forest Economist, Burma.)

Tho replaced by machinery in many phases of production, elephants still provide the most effective power for removing logs from the jungle. One animal can pull a log, containing 1,000 board feet, two miles a day, working from sunup until noon for three days, then resting for two.

A war-incurred shortage of elephants has resulted in the trial of tractors and bulldozers for dragging. Where terrain permits, two-wheeled carts, small tramways, and monorails may be used to extract the timber. However, volume yield per acre does not justify building modern railways.

Bangkok is the exporting city for Siam, while Rangoon on the Irrawaddy River and Moulmein near the mouth of the Salween are Burmese ports. Some teak from Siam and French Indo-China is floated down the Mekong and shipped from Saigon.

In 1948, the Burmese government launched a program to completely nationalize the industry by 1951. Siam is attempting to

compensate foreign concessioners for war-incurred losses. This government intervention is an attempt to boost production to pre-war levels, which is expected to require about four years. Burma is now producing only one-third of its normal yearly average of about 4,000,000 cubic tons (1 cu. ton = 50 cu. ft.), half of which is exported. Siam is the second greatest producer, exporting about 65,000 cubic tons annually. Great Britain and the United States are the principal importing countries.

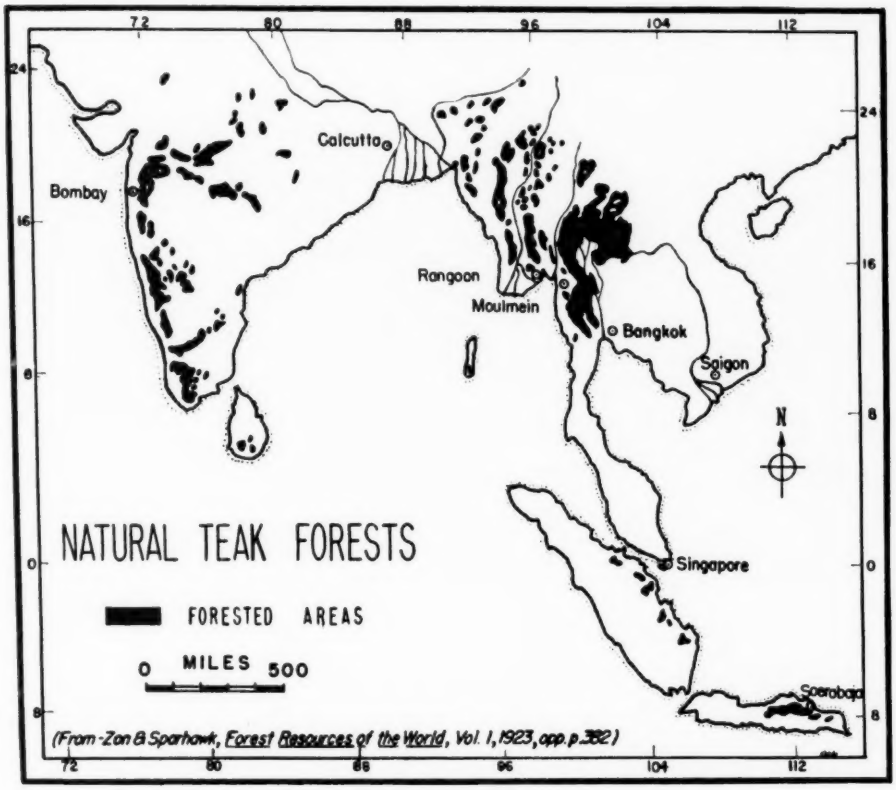

FIG. 2. Distribution of teak forests.

In normal times, the United States buys about 2¼ million board feet of teak, chiefly in the form of lumber.[1] In the first six months of 1948, this trade amounted to a little over a quarter million board feet. Imports reached an all-time peak of 7,043,000 board feet in 1941, probably the result of stockpiling, and fell to a mere trifle during the war years. The principal use of teak in this country is

[1] Figures on U. S. imports are from the Dept. of Comm.

in shipbuilding, altho there is an increasing demand for it in planing mill industries.

Teak is cultivated, and found occasionally in a wild state, on several islands in the Caribbean. The largest of these are Trinidad, where plantations were started in 1913, and Cuba. Tho not important in world trade, these areas may have great potential strategic value. If properly developed, they could supply the relatively small wartime volume required by this country. Closer and easier to defend, they would insure a constant supply. Better Inter-American relations might be fostered by buying the wood here.

Unique in its properties and colorful as an industry, teak remains one of the world's leading tropical hardwoods. Indications are that industry, recognizing the qualities of the wood, will find more and varied uses for it as it becomes more plentiful.

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SOIL PROFILE SECTIONS

ARCH C. GERLACH
University of Wisconsin

If properly taken, soil profile sections show accurately the thickness of horizons; reveal such physical characteristics of the soil as texture, color, and structure; indicate roughly the extent of erosion; and provide surplus soil samples for subsequent chemical analysis. The degree to which a particular soil profile serves these purposes varies with the methods used in taking, preserving, and analyzing it. Instruments of several types have been created for subsurface sampling, but they may be generally grouped into the categories of augers and tubes.

Simple but effective augers may be made for field reconnaissance or class demonstration purposes by welding three or four feet of ordinary water pipe with a "T" handle onto a common wood auger with a slightly larger diameter. Such a tool brings to the surface only a few inches of soil at each operation, and the

soil fragments are so displaced in relation to each other that only a general idea can be obtained of horizon depths, soil structure, or the degree of weathering and erosion. Profile sampling with augers does provide, however, an inexpensive and rapid technique which is most useful for locating surface boundaries between soil types or for rocevering subsurface samples for chemical analysis.

Soil sampling tubes operate on a different principle. One recently perfected[1] by the University of Wisconsin Soils Department slips into the ground without disrupting the soil structure, and recovers a true profile column about three-quarters of an inch in diameter. The mechanism is simple, and effective in bringing to the surface a less disturbed cross-section than the auger, but sampling tubes will not penetrate stony soils or those containing many roots or hardpan layers.

An attempt to combine the auger and tube sampling techniques has resulted in a combination instrument[2] currently used by Soil Conservation Service field men. It is a three inch auger with a hollow center which will return profile sections in six inch segments, each segment being relatively undisturbed.

Of all the instruments devised for profile exposure, none has surpassed, in the opinion of the author, the old fashioned spade coupled with sound judgment in selecting places to dig. For educational purposes the most effective soil profiles are those revealed by vertical cuts from the earth's surface to the underlying bedrock. Valley bluffs, road cuts, quarry walls, etc., are seldom vertical and are usually covered by slope wash. Such exposures can be cleaned up with relatively little physical effort, but the horizons of a cliff are not representative of the horizons thruout an adjacent region unless the cliff has been exposed very recently. Increased gradient near an exposed cliff accelerates erosion and thins the A horizon, while exposure of the mantle rock unduly increases weathering in the C horizon. The best profile sections for detailed study are exposed by digging pits at carefully selected points. Since considerable labor is involved in digging fresh soil pits, some of which must be several feet in diameter to permit digging operations to reach bedrock, it is highly desirable to preserve the profiles once they have been carefully exposed.

[1] Soil sampling tubes may be purchased from the Central Scientific Company, Chicago, Illinois.

[2] Constructed by R. C. Jordan, 4616 Olivewood St., Riverside, California. (Cost approximately $10.)

Several methods[3] have been evolved for preserving soil profiles, but the technique described below is the one used in preparing profile specimens for laboratory use in elementary physical geography courses at the University of Wisconsin. The preserved specimens have a completely natural appearance, and have endured considerable handling and examination by students without showing any evidence of deterioration.

The equipment needed to take and preserve large profile specimens is not elaborate. It includes:

1. the common tools for digging a pit (pick, shovel, and spade),
2. a frame made of 2 x 2 inch angle iron, inside dimensions 8 x 48 inches,
3. a heavy knife, 12 to 15 inch blade,
4. a board cut to fit over the face of the iron frame (10 x 50 inches) and bolts or clamps to hold the frame and its board cover together,
5. some 10 x 50 inch boards, and 1 x 2 inch wooden strips to replace the angle iron flanges when the metal frame is removed, plus a few 8 penny box nails,
6. a heavy hammer or maul,
7. a bucket (8 to 12 quarts),
8. a few gauze or cheese cloth strips about 2 x 5 feet.

Chemicals for "fixing" or preserving the soil profiles include:

1. acetone, a rapidly evaporating solvent,
2. methyl isobutyl ketone,[4] a slowly evaporating solvent,
3. vinylite resin VYHH Special #1, powdered form.[5]

A 12 per cent (by weight) solution of the vinylite resin should be made in each of the solvents several days in advance. The acetone solution tends to evaporate rapidly and concentrate the resin at the surface, while the ketone solution tends to evaporate slowly and cement the soil to the backing board and to remove any gloss or unnatural appearance from the surface. For most soils a mixture of 60 to 70 per cent acetone solution and 30 to 40 per cent ketone solution is satisfactory, but in heavy clays a larger proportion of

[3] Berger, K. C. and Muckenhirn, R. J., "Soil Profiles & Materials Embedded in Transparent Plastics," *Soil Sc. Soc. of America*, V. 11, 1946, pp. 484-485.

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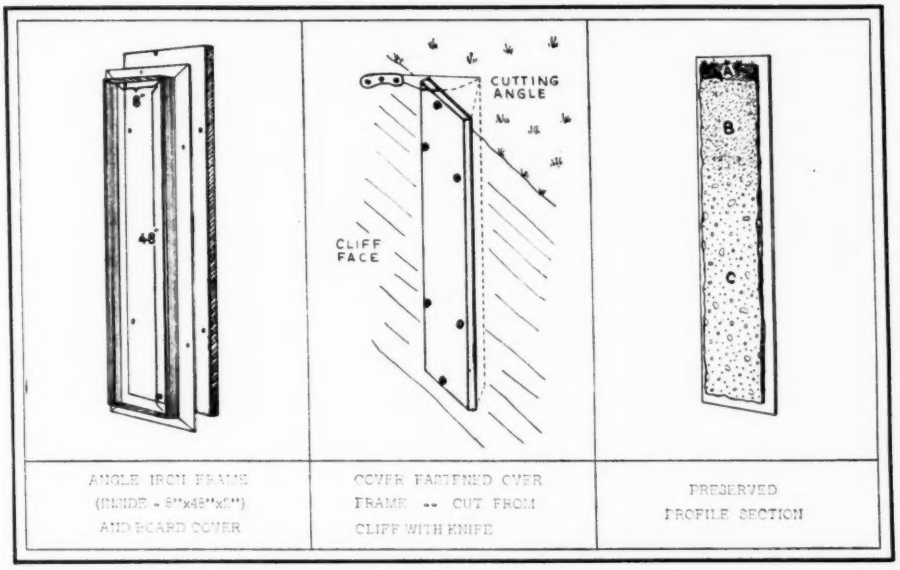
[4] Available in one or five gallon containers from the Carbide and Carbon Chemicals Corp., 230 N. Michigan Avenue, Chicago 1, Illinois.

[5] Available in 60 pound bags from Bakelite Corporation, 30 East 42nd St., New York 17, N.Y.



the ketone solution is required. Between one and two quarts of solution will saturate and permanently harden the average soil profile section.

The process of taking profiles and preserving them is enthusiastically undertaken by most students and provides an excellent medium for teaching many related laboratory and field techniques. The principal steps are outlined below, but slight modifications must be made to fit weather conditions and soil textures.

1. Select the site for a soil pit carefully. Avoid ploughed fields, alluviated flats, unusual slopes etc. if a complete soil type profile is desired.
2. Dig a pit about 4 x 6 ft. at least 4½ ft. deep, avoiding whenever possible soils that are frozen, saturated with water, or unduly dry.
3. Smooth a vertical exposure somewhat larger than the angle iron frame and drive the frame into the soil bank so that surface vegetation and roots are included if possible. Coarse soils that tend to slump should be treated first with a quart of vinylite solution (⅔ acetone and ⅓ ketone) and covered with gauze before pounding the frame into place. Longer frames may be constructed if more than four feet are needed, but more frequently complete profile sections are less than four feet in depth. Shorter sections may be taken with the

four foot frame by allowing it to protrude above the surface.

4. The backing board is next bolted or clamped to the metal frame, which is then separated from the soil bank by cutting around and behind it with a large knife. If the soil tends to slump out of the frame, a plywood strip may be inserted behind the frame as cutting progresses from the top downward. The frame, with the soil profile in it, is then tilted backward and surplus soil trimmed to the level of the frame flanges.
5. Both the exposed face of the soil profile and a 10 x 50 inch board are then moistened with vinylite solution, and the board is held tightly over the profile while the metal frame is turned over so that the profile rests on the new board. The backing board, first bolted or clamped to the metal frame, should now be removed. Some 1 x 2 inch wooden strips should be placed around the outside of the angle iron flanges and pressed inward against the soil as the metal frame is slowly removed. The strips may be nailed to the board on which the profile is resting, thus forming a container for its removal to the laboratory. If the return trip is very rough, or if the profile cannot remain horizontal, a cover may be nailed lightly over the top to prevent soil loss or slippage. The metal frame and its original cover are thus freed for taking duplicates[6] while the soil pit is fresh or for taking profiles of additional soil types.
6. In the laboratory the 1 x 2 inch side strips on the profile container are replaced by ½ to 1 inch strips and the profile section is trimmed to reduce its total weight and volume. One inch is recommended for silt and clay, and ½ inch for sandy and gravelly soils. An ice pick or knife point should be used to pick or flick off the surplus soil in order to expose the natural structure. If the soil has dried out, it should be moistened before triming and then allowed to dry thoroly before the vinylite solution is applied.
7. One or two quarts of vinylite solution (mixing acetone and ketone as required by the soil texture) may be needed to saturate the soil profile. After the plastic has dried about 30 to 40 minutes, the side strips may be removed and the edges

[6] The University of Wisconsin Geography Department welcomes exchange arrangements to trade duplicate profiles of Wisconsin soils for types not found in the state.

of the backing board should be cleaned. In 24 to 48 hours the profile will harden and may be handled freely or mounted on a wall as an exhibit. If the face of the profile assumes a varnished appearance, brush it lightly with pure methyl isobutyl ketone to achieve a perfectly natural appearance.

Miniature soil profiles may be constructed by using ¼ (or any other desired proportion) of each inch of the true profile. The miniatures may be kept in bottles or fixed with plastic solution like the larger exhibits but they lose their original structures.

Conclusions

Subsurface sampling for field reconnaissance purposes may be done quickly and inexpensively by means of soil samplers or by cleaning slope wash from the surface of recently made cliffs and road cuts. True profiles for scientific study or classroom analysis are best obtained from newly dug soil pits at carefully selected sites. Profile sections from those pits may be preserved for future exhibit and examination by treating sections mounted on boards with plastic (vinylite) dissolved as a 12 per cent solution in acetone and methyl isobutyl ketone. The making of such profile exhibits is a stimulating and fruitful educational device, and the durability of the profiles makes it possible to exchange local duplicates for additional types from distant areas. Profiles pieced together from tube sampling devices, or from proportions of a true profile, to make miniatures are less useful for varied purposes than the total profile sections but may be used as substitutes where economy of time and materials warrants the use of those techniques.

DR. WALLACE W. ATWOOD
1872-1949

July 24, 1949, marked the passing of Dr. Wallace W. Atwood in his 76th year. Death occurred at his summer home on Cape Ann where he had gone after returning from a trip to the Pan Pacific Science meetings in New Zealand. He was President Emeritus of Clark University, founder and Director of the Graduate School of Geography, as well as initiator of the magazine, *Economic Geography.*

Dr. Atwood was a masterful teacher, an artist in the classroom, and a prolific writer. His works range from textbooks for use in all grades to complex physiographic problems. The Rocky Mountains were his favorite haunt. By advice and example—first at Chicago, then Harvard and finally at Clark—he directed the host of students whose privilege it was to know and study with him. The annual fall field camp which has been an integral part of the Graduate program of Clark University's School of Geography attests to his belief and desire that true geographic training begins in and returns to the field.

All scholars in scientific fields and his many personal friends in this and foreign lands regret the loss of Dr. Atwood' international outlook and goodwill as well as his warm cordiality. The work of his life stands as a monadnock in the landscape of his generation.

HENRY J. WARMAN

NATIONAL COUNCIL AT WORK

A record of productive work by committees in the National Council is essential to the success of the organization. Abstracts of annual reports of two of the most active committees follow. The first is a shortened version of the 1948 report of the aviation committee which is headed by Dr. R. L. Tuthill; the second is an abstract of the 1949 report of the Committee on Compilation of Suggestions and Bibliography For Use by Curriculum Committees. This committee is under the direction of Miss Mamie L. Anderzhon.

The Status of the Interrelationships Between Geography and Aviation

The interrelationships between geography and aviation are varied and vital. Aviation needs maps and mapping, data on location, on supply and demand for resources, on weather and climate, on terrain and surface features, on occupance patterns both general and specific—these and a host of other geographic data are essential to aviation development. Moreover, flight charts are drawn by geographically trained cartographers; route patterns are developed and commodity analyses are made by economic geographers; weather charts and predictions are prepared by geographically trained meteorologists; logistic plans, resource evaluations and production patterns are analyzed and plotted by professional geographers.

But geography not only gives to aviation, it takes much in return. Aviation has created an awareness of the need for geographic information on the part of the public in general. The beginner, the difficult junior-high school student, the blase high school senior, the sophisticated collegian, and the practical adult, all may be reached and held by the magnet of aviation.

Not only does aviation entice people to learn geography, but it also forces a revaluation of the concept of relative location, creates new and significant time-distance concepts, forces revolutionary changes in population and industrial patterns, and is also changing the geographic principle of inaccessibility.

Relationships between geography and aviation are sound and permanent. Aviation agencies of the government, the aviation industry, and numerous educational groups and individuals are offering publications, courses of study, work units, maps, films and other teaching aids to foster closer relationships and to solidify the status of the two fields. In return aviation asks that geographers utilize and contribute to these materials, that they train specialists of direct and practical value to aviation, and that they play their part in education for world citizenship—thus meeting the greatest challenge ever made to geography.

Committee on Compilation of Suggestions and Bibliography For Use by Curriculum Committees

Since it is the common practice of curriculum committees to ask "What are the most recent practices recorded in the literature?" this committee set for a 1949 goal the following:

1. The preparation of an annotated bibliography of articles that bear on this subject in the JOURNAL OF GEOGRAPHY beginning with 1949 and working back to the year 1939.

2. The secretary made available the list of State Co-ordinators. This list was used as the mailing list for developing item 4 as found in the Planning Committee's list of recommendations.

The following goals have been reached:

1. The preparation of an annotated bibliography of articles in the JOURNAL OF

Geography 1939-1949 which deal with geography curriculum in the Senior High School (grades 10, 11, 12).

2. The preparation of an annotated bibliography of articles in the Journal of Geography 1939-1949 which deal with geography curriculum in the Junior High School (grades 7, 8, 9).

3. The preparation of an annotated bibliography of articles in the Journal of Geography, 1939-1949 which deal with geography curriculum in the Elementary Grades (3-4-5-6).

4. A letter in the form of a questionnaire was mailed to all of the Co-ordinators. Information was requested on State Courses of Study, State Bulletins on Geography and persons available for consultation with curriculum committees. A bibliography of State Courses of Study and Bulletins on Geography prepared by Departments of Public Instruction in the states (29) replying to the questionnaire has been prepared by the committee. This bibliography includes references to materials issued since 1940. A list of geographers available for consultation in each of the 29 states has been prepared by the committee.

Earl B. Shaw, *President*

EDITORIAL NOTES AND NEWS

The Geography Section of the Central Association of Science and Mathematics will meet November 25, 1949 at 2:30 p.m. in the Edgewater Beach Hotel, Chicago. Dr. S. M. McClure of Eureka College, Eureka, Illinois will read a paper on "Our Mineral Resources." Officers of the geography section are: Chairman, Dr. Floy Hurlbut, Ball State Teachers College, Muncie, Indiana; Vice-chairman, Laura L. Watkins, Lincoln School, Cicero, Illinois; and Secretary, Mabel Washburn, Shortridge High School, Indianapolis.

The Geography Club of Western Pennsylvania held its annual fall meeting in Pittsburgh, October 14, 1949. The out-of-state guest lecturer was Dr. Loyal Durand, Jr., University of Tennessee who spoke on "Teaching Regional Concepts in the Geography of North America." Miss Adeline Dull, Corapolis, directed an exhibit of geography materials. Miss Viola Phillips, New Kensington and Virginia Schauer, North Hills Joint Schools presented papers on "Living, Learning and Sharing Geography." Officers are: President, Elizabeth Glass Beadling, Penn Township High School; Vice-President, Frances Hanson, University of Pittsburgh; and Secretary, Sara Butz, Versailles Township, McKeesport.

The National Geographic Society has been publishing Geographic School Bulletins for thirty years. The first of thirty issues planned for the 1949-1950 school year appeared on October 3.

The Association of American Geographers will hold its next annual meeting at Clark University, Worcester, Massachusetts, April 5-9, 1950.

Guesses on oil reserves of Western Canada now indicate that the reserves are in the order of one billion barrels. It is probable that this estimate will be revised upward following further exploration. The new Golden Spike area, with only one well at present, has a 545 foot oil-producing section. It is probable that a pipe line will be built to the Great Lakes so as to supply the oil needs of Eastern Canada.

Goode's School Atlas

Revised Edition—1949

For years, this atlas has been the standard map reference book for geography teachers throughout the country.

It was used as a basic textbook in military training centers during the war, and is now used in many colleges.

Teachers everywhere, in colleges and high schools, will be pleased with the revised edition. In many respects the 1949 edition is a *new* Goode's School Atlas. There are new maps in the World and Economic Sections. Regional Maps have been revised. Our circular GSA-1, illustrated with maps from the new atlas, will give you detailed information.

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Christmas

will soon be here. In these times what could be a finer gift than a membership in the National Council of Geography Teachers and the Journal of Geography? With the great demand for more and better geographic education, what could be a more helpful and welcome aid to your friend? Now is the time to act. Send the dues (only $3.00) to the Editor and he will write your friend explaining your splendid gift.

JOURNAL OF GEOGRAPHY
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Tell Advertisers You Saw It in the JOURNAL

Geography In the High School

This new volume, in the Geographic Education Series, was prepared by a committee of the National Council of Geography Teachers, of which Dr. Zoe Thralls, University of Pittsburgh, was chairman. It is the only available book devoted entirely to geography at the level of the secondary school. With the increasing interest in the inclusion of courses in geography, teachers of junior-senior high school geography and social studies will find useful materials in this compilation of more than sixty contributions by teachers who are directly interested in teaching geography in the high school.

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EDITORIAL NOTES AND NEWS

The site of Mexico City on a spongy clay creates complex problems for the engineers constructing heavy buildings. Man is still searching for a better method to cope with this problem of site. The land on which Mexico City is constructed is settling and some heavy structures are settling faster than the land. In five years one concrete building has settled so rapidly that the ground floor is a foot below the street level. Engineers were two successful in preventing one building from sinking. They placed the building on piles and now as the street level sinks, the building becomes taller. Suggestions for future construction are "mount the ground-floor slab on screws so that it can be lowered as the surrounding street settles" and "use a long type of concrete pile with a precast concrete 'button' on the end. This type of pile has been used in the United States in similar foundation conditions."

According to Dr. Antoon de Vos, ten wild animals are nearing extinction. The ten which may disappear forever from the face of our earth are the one-horn rhinoceros of Java, the pig-footed bandicoot of Australia, the Tasmanian wolf, royal chinchilla of Peru, wolverine, European wisent, Asiatic lion, giant sable antelope, brow-antlered deer, and South African mountain zebra. Dr. de Vos, formerly of the Netherlands East Indies is now with with the Canadian Department of Lands and Forests.

Dr. Esther S. Anderson, Department of Geography, University of Nebraska, who is editor of the Nebraska Council Bulletin welcomes copies of bulletins or publications prepared by other councils or associations, and will in return send sample copies of the Nebraska Council Bulletin.

Have you been reading the fine articles in the Teachers Edition, *Scholastic Magazine?* If not, stop by your library and start by reading the December 1, 1948 issue in which Mr. J. W. Studebaker, former U. S. Commissioner of Education, has an article entitled "How Much Social Science in the High School?" One paragraph in the article reads, "Geography today is of such paramount importance that all pupils in the high schools should be given definite instruction in economic geography."

The Geographical Association will hold its Spring Conference, 1950 in Falmouth, Cornwall, Great Britain, from April 11 to 15, 1950, inclusive.

The Australian News and Information Bureau has published a list of booklets, posters, maps and other literature concerning Australia that are now available for the use of teachers. Most of these materials may be had for payment of postage. Included in the list is a film catalog of 16 mm. films, both in color and black and white. The film rentals are reasonable and the catalog is free. Those interested should write the Australian News and Information Bureau, 636 Fifth Avenue, New York 20, New York.

The Nebraska Council of Geography Teachers is now organized by districts. The districts of the Council cover the same areas of the state as the divisions of the Nebraska Educational Association. District vice-presidents of the Nebraska Council are: Olga Anderson, Beatrice City Schools; Dorothy Bell, Fremont City Schools; F. G. Dale, Wayne State Teachers College; Richard N. Diffenderfer, Kearney State Teachers College; and Flora Dutcher, McCook City Schools.

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EDITORIAL NOTES AND NEWS

Are we teaching enough urban geography in our high school geography courses? Urban geography is local, community or county geography and should be of interest to most of our pupils. Since 1940 fifty-seven per cent of the United States population lives in urban communities.

Los Angeles reports with its present water supply the city has about reached the limit of its growth. This report stresses that altho the local and Owens-Mono sources are adequate for present needs, they are being used to capacity without pumping in the Owens Valley. Future supplies to provide for growth or excessive periods of drought must come from the Colorado River.

Two buried dwelling places of stone age men in Arctic Alaska appear to be conclusive evidence that stone age man followed the receding glacier of the Ice Age and made permanent homes there. An old campsite has been located on Seward Peninsula. Near Deering a recently discovered cave contains stone artifacts.

According to Dr. Vilhjalmur Stefansson, explorer and scientist, the Soviet Union has established six cities north of the Arctic Circle in the U.S.S.R. with a population of more than ten thousand each. The Soviet plan is to have each city the center of a self-supporting community. The Igarka community, fifty miles inside the Arctic Circle grows barley, rye, root crops and hay. Stefansson points out that the Russian city of Norilsk, over two hundred miles farther north than any part of the Canadian mainland, has a population of some forty thousand people. He believes that Canada and the United States are neglecting the Arctic.

Have you seen a copy of the news letter, ANDG, prepared by the Association of North Dakota Geographers? Miss Viola M. Bohn, Junior High School and Junior College, 1008½ Avenue C, Bismarck is both president of the Association and acting editor of the news letter. The latest issue is a good-size bulletin of over twelve pages. The largest item in the bulletin is a ten-page single-spaced outline for teaching a unit on Russia in a high school Global Geography course.

Have you seen the ten-minute sound films on Soil, Water, Erosion, and Soil and Water Conservation prepared under the direction of Carl Pryer, Jr. and issued by the United States Department of Agriculture, Soil Conservation Service?

Have you seen Circular No. 310, Selected References for the Teaching of Geography and Conservation, prepared by Halene Hatcher and issued by the Division of Secondary Education, Office of Education, Federal Security Agency in August, 1929? The circular consists of five bibliographies on (1) Philosophy and Goals, (2) Programs and Procedures, (3) Audio-Visual Aids, (4) Inexpensive Teaching Materials, and (5) A Bibliography of Bibliographies.

Due to heavy pumping of ground water for domestic and irrigation purposes, below-surface infiltration of ocean water is becoming serious in certain places in California. The United States Geological Survey recently issued a short report on salt-water contamination in the deep regolith in coast parts of Orange County, California.

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